

**Title**

*K2K*

**Physics Goals**

*It is the first accelerator-based experiment that will confirm/debut the atmospheric neutrino-mixing phenomenon, and will improve our knowledge of mixing parameters if oscillation is observed. It will probe  $\Delta m^2$  down to  $2 \times 10^{-3} \text{ eV}^2$  at  $\sin^2(2\theta_{23}) \sim 1$  (90% c.l.);  $\sin^2(2\theta_{23})$  at  $\Delta m^2 \sim 7 \times 10^{-3} \text{ eV}^2$  (90% c.l.). As a by-product, it can study low-energy neutrino interactions.*

**Features**

*It utilizes a broad-band muon-neutrino beam produced with the KEK 12-GeV PS. With a near detector located at 300 m from the pion production target, the properties of the neutrino beam are monitored and low-energy neutrino interactions are studied. The near detector is made up of a one-kton water Cerenkov detector augmented with a 1-kton fine-grained tracker and a drift tube-based muon station. Located at 250 km away from the target, the far detector is Super-Kamiokande, a 22.5-kton water Cerenkov detector with excellent efficiency in detecting electrons or muons. The search for neutrino oscillation is performed by comparing the fluxes of muon neutrino at the near and the far detectors.*

**Technological Challenges**

*High-precision alignment of the beam line and the far detector.*

**LBNL Contribution and Interest**

*Upgrade front-end electronics; data analysis  
At least three physicists if join now.*

**Status**

*Taking data, about half way through.*

**Timeline**

*Duration of Experiment: mid-1999 to Mar of 2005.*

**Location**

*Accelerator: KEK 12 GeV PS; Near detector: 300 m from target; Far detector: Super-Kamiokande*

**Collaboration**

*About 100 physicists from Japanese(60%), Korean(15%), Polish(1%) and U.S. (25%) institutions.*

**Funding Sources**

*Ministry of Education, Culture, Sports, Science and Technology, Government of Japan, Japan Society for Promotion of Science, [U.S. DOE](#), Korea Research Foundation, Korea Science and Engineering Foundation.*

**Resources, Links, and References**

*Websites: <http://neutrino.kek.jp/>  
Preprints: J. Hill, hep-ex/0110034; PL **B511**, 178 (2001).*

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